DANUBE DELTA NATIONAL INSTITUTE
FOR RESEARCH AND DEVELOPMENT
TULCEA * ROMANIA

ECOLOGICAL RESTAURATION IN THE DANUBE DELTA

Romanian Ministry of Environment
and Water Management

2004

DANUBE DELTA NATIONAL INSTITUTE FOR RESEARCH & DEVELOPMENT

TULCEA - ROMANIA

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Danube Delta Symbo
DANUBE DELTA NATIONAL INSTITUTTE
FOR RESEARCH AND DEVELOPMENT
TULCEA - ROMANIA
REZERVAȚIA BIOSFEREI DELTA DUNĂRII
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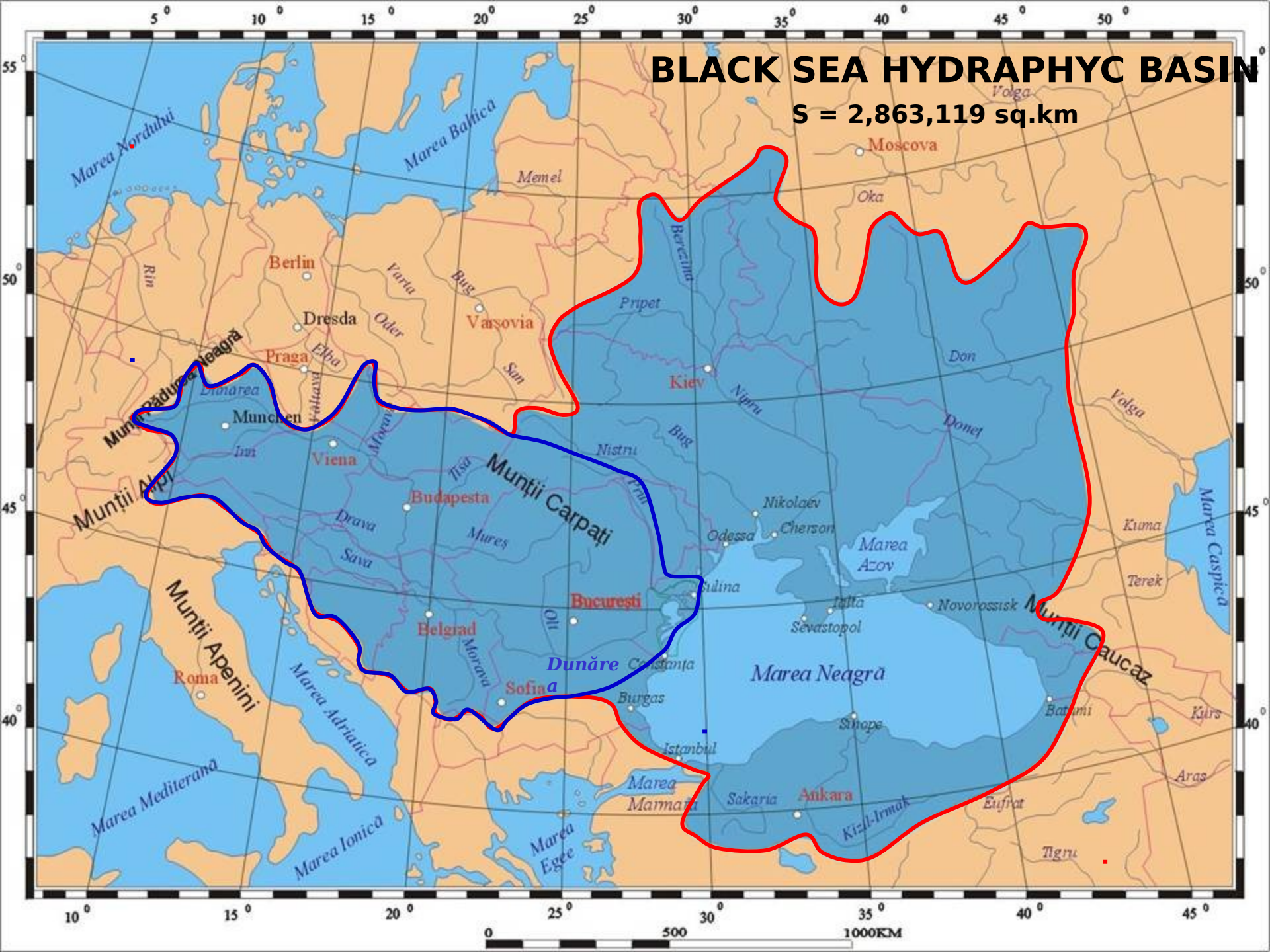
DANUBE DELTA INSTITUTE

Scientific research supporting implementation of national policies and international conventions related to biodiversity conservation and sustainable development in the Danube Delta and other wetlands of conservation interest.

(Romanian Gov. Decision no.409/1999)

Danube River and Danube Basin

817,000 sq.km catchment basin – 8% of Europe su

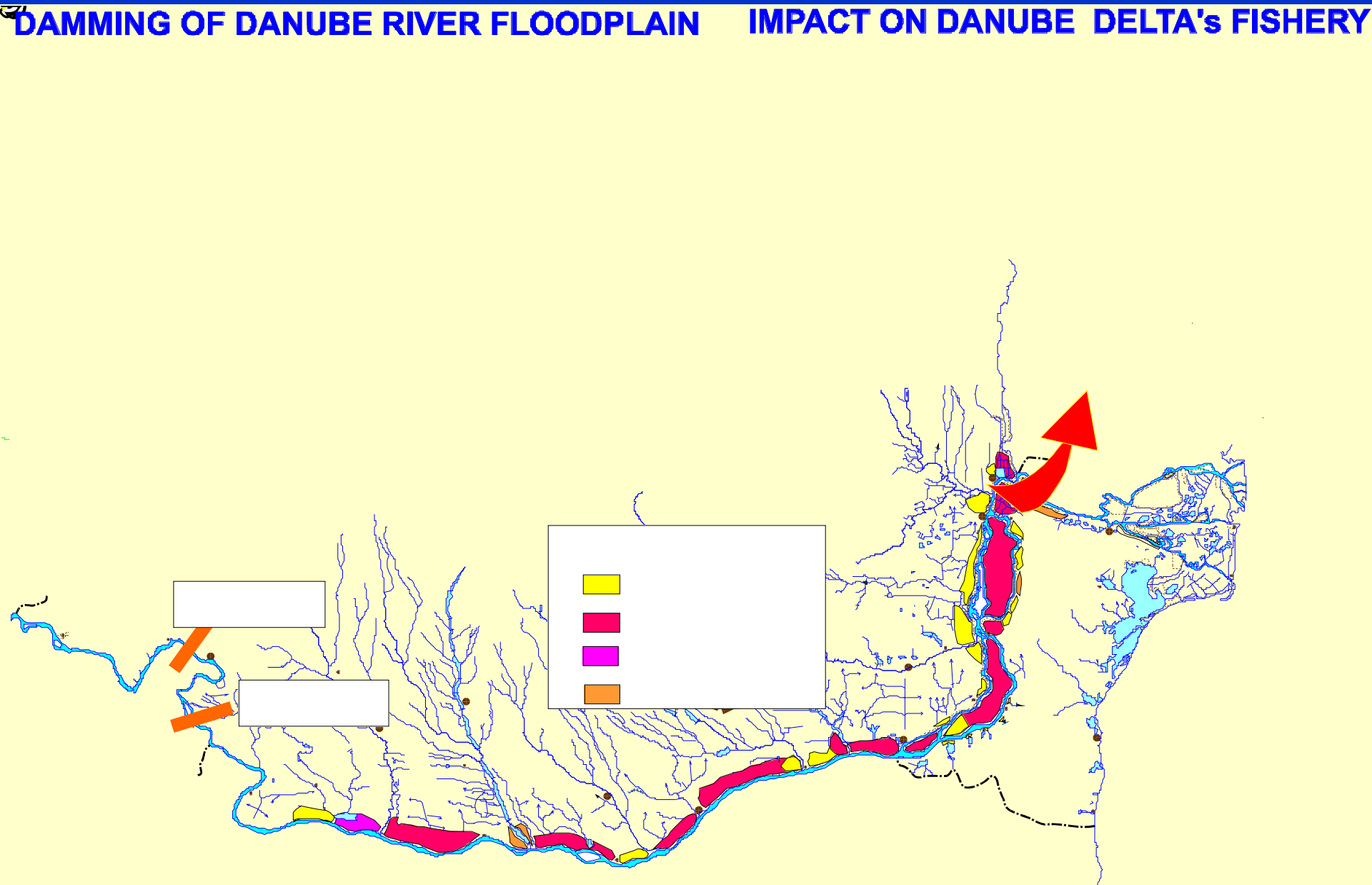

BLACK SEA HYDRAPHYC BASIN
S = 2,863,119 sq.km
Marea Nordului
Marea Baltica
Memel
Moscova
Volga
Oka
Berezina
Pripet
Don
Kiev
Nipru
Donet
Volga
Berlin
Varta
Rin
Bug
Dresda
Oder
Varsovia
Praga
Elba
Vltava
San
Munții Pădurea Neagră
Dunarea
Munchen
Inn
Viena
Moldova
Munții Alpi
Nistru
Bug
Tisa
Munții Carpați
Prut
Budapesta
Nikolaev
Drava
Mureș
Odessa
Cherson
Kuma
Marea Caspica
Marea Azov
Sava
Sulina
Terek
Ialta
Novorossisk
Munții Caucaz
Sevastopol
Bucureşti
Munții Apenini
Olt
Belgrad
Morava
Dunăre
Constanța
Marea Neagră
Roma
Marea Adriatica
Sofia
Burgas
Batumi
Kura
Sinope
Istanbul
Aras
Marea Mediterană
Marea Marmara
Sakaria
Ankara
Eufrat
Kizil-Irmak
Marea Ionică
Marea Egee
Tigru
0
500
1000KM

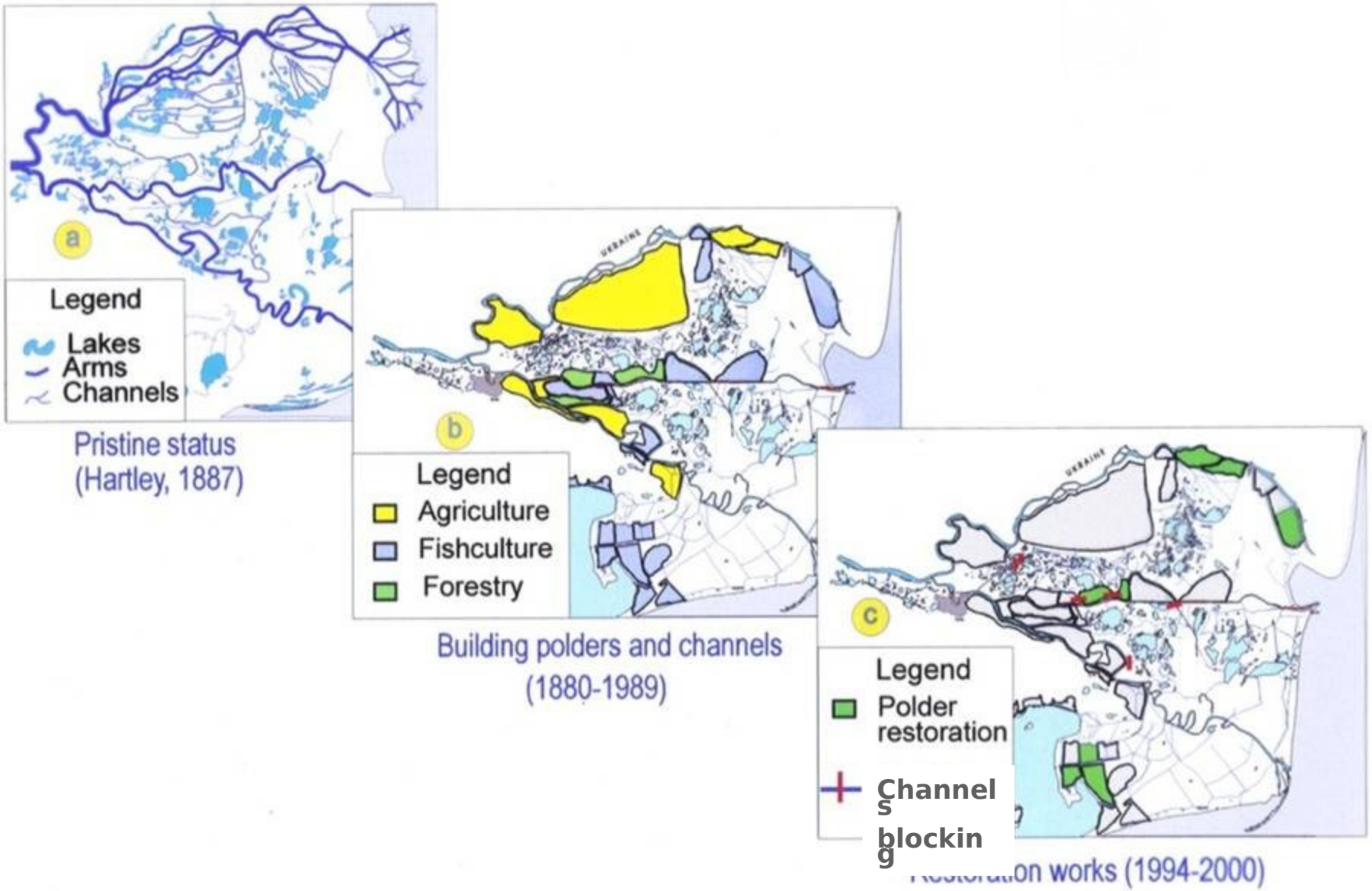
WHY ECOLOGICAL RESTAURATION PROGRAMME ?

Motivation:

- **Human impact**
  - **upstream Danube Delta**
  - **in the Danube Delta**
- **Global climatic changes**

DAMMING FLOODPLAIN UPSTREAM DELTA





PHASES IN THE DANUBE DELTA RECENT HISTORY

HUMAN INDUCED CHANGES IN DANUBE DELTA

Nitrogen: 300,000-400,000 t/year
Phosphorous: 45,000-60,000 t/year
Oil: 45,000-50,000 t/year

HUMAN INDUCED CHANGES IN THE LOWER DANUBE RIVER BY

HABITAT REDUCTIONS

BY

DAMMING UPSTREAM FLOODPLAIN AND 22% OF THE DELTA

AND

BUILDING BARRAGES AT KM 942 AND KM 863 FROM RIVER MOUTHS

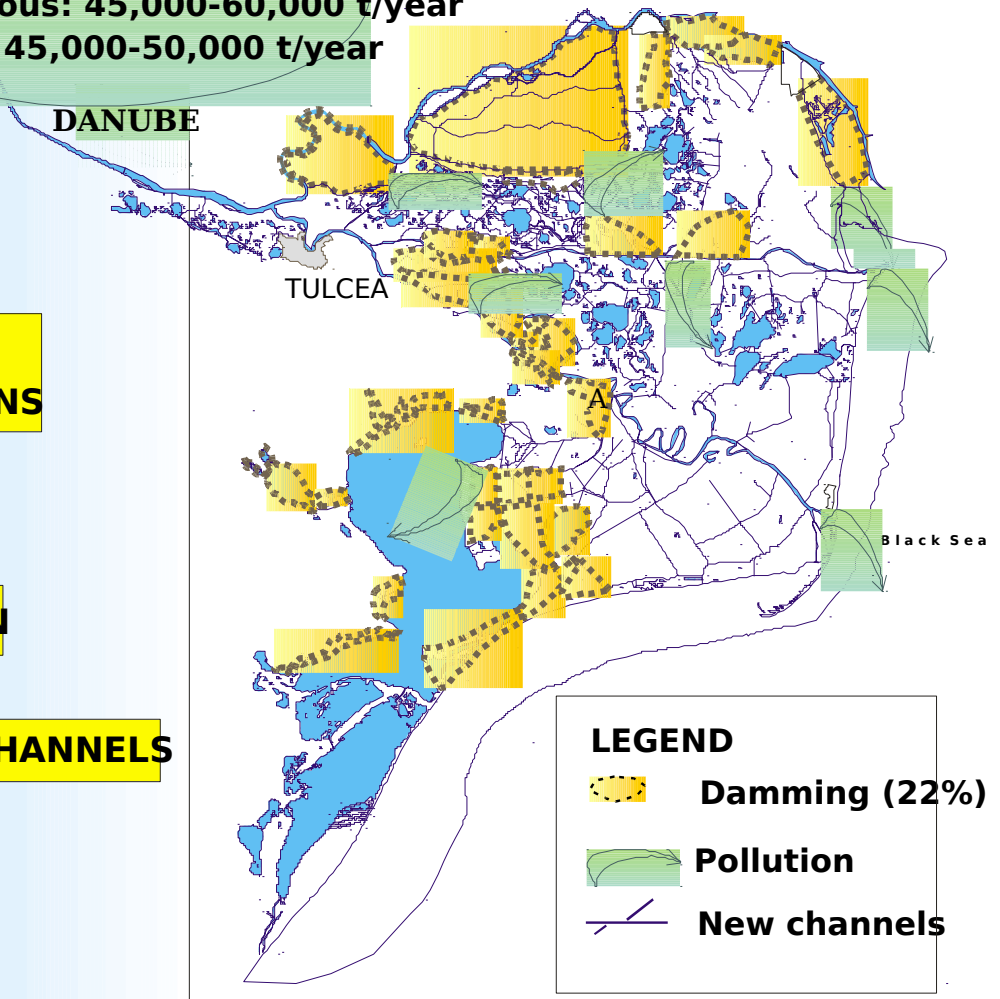
HABITAT ALTERATIONS

BY

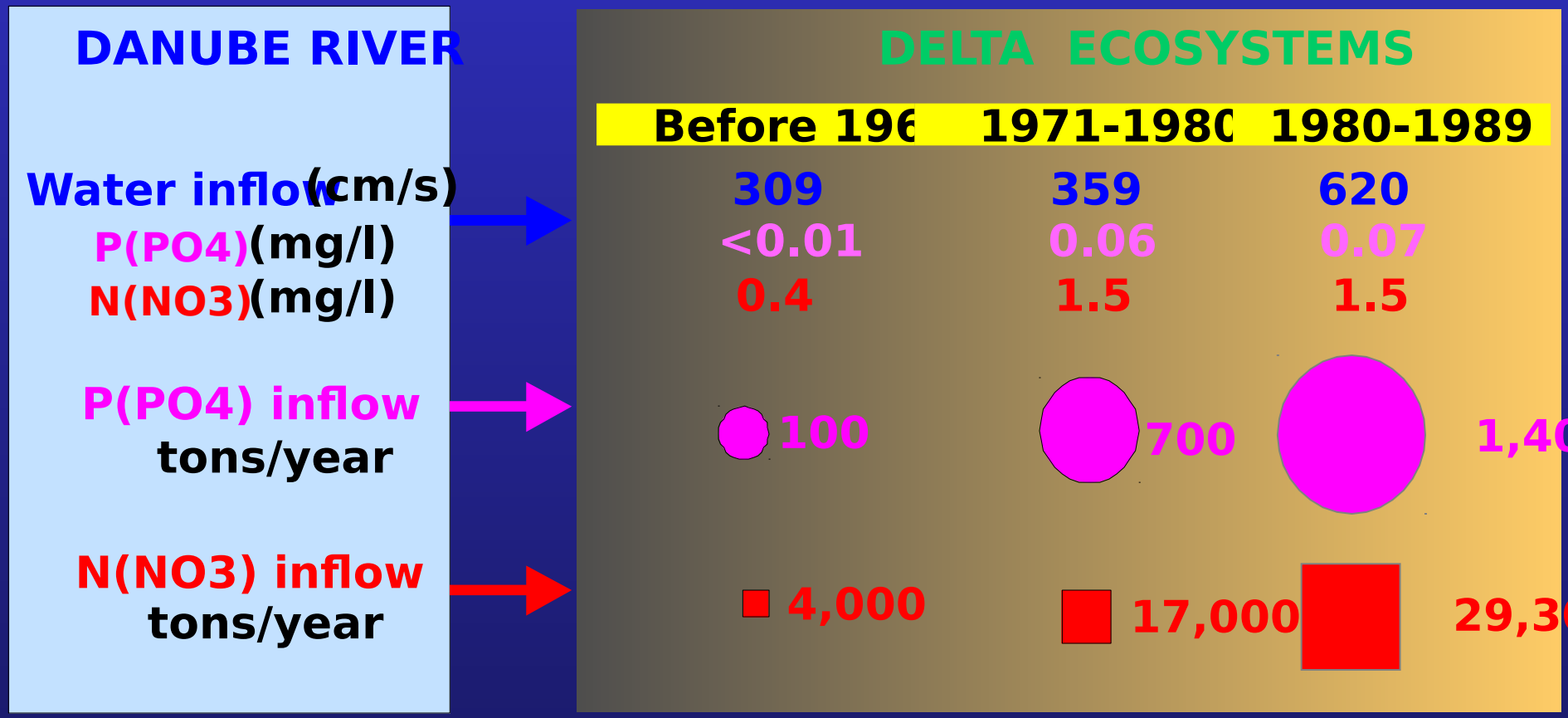
POLLUTION

AND

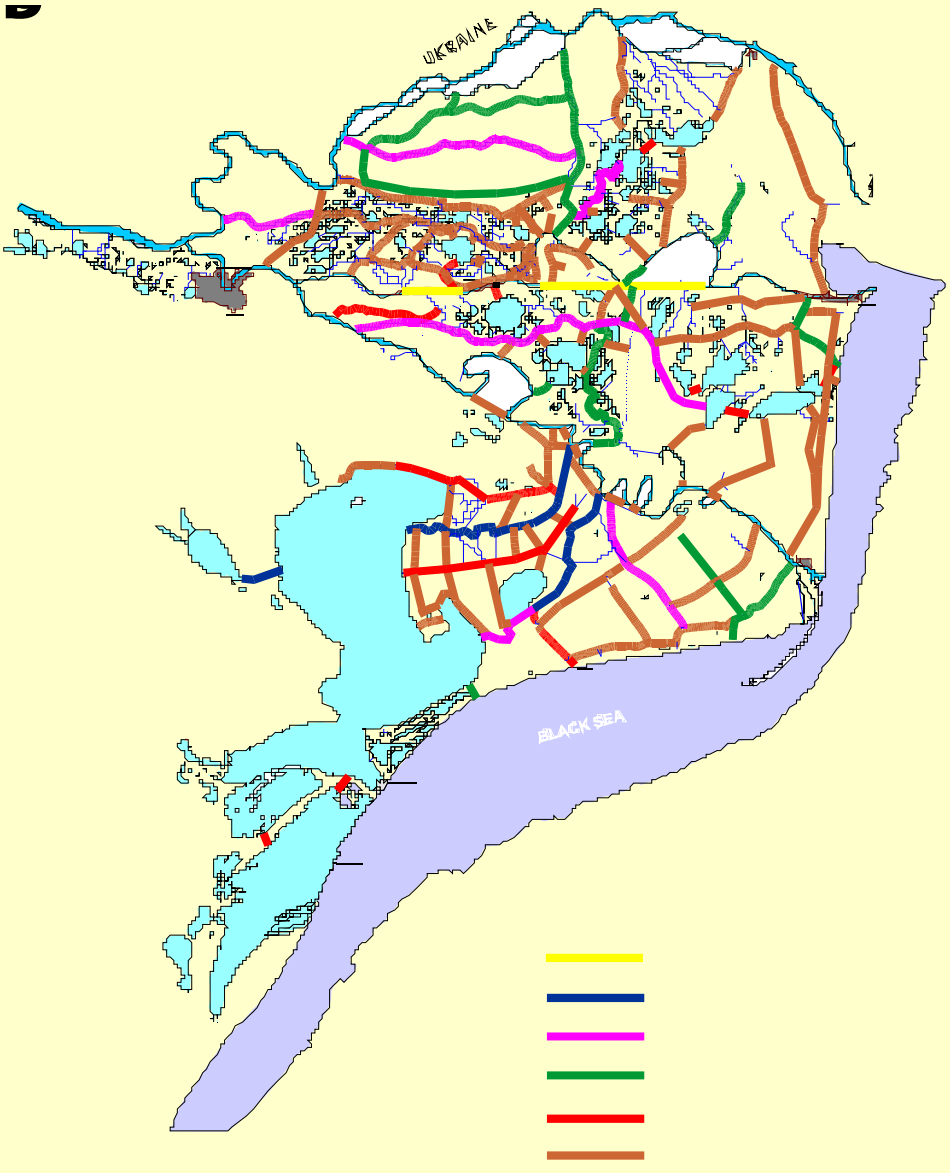
DREDGING CHANNELS

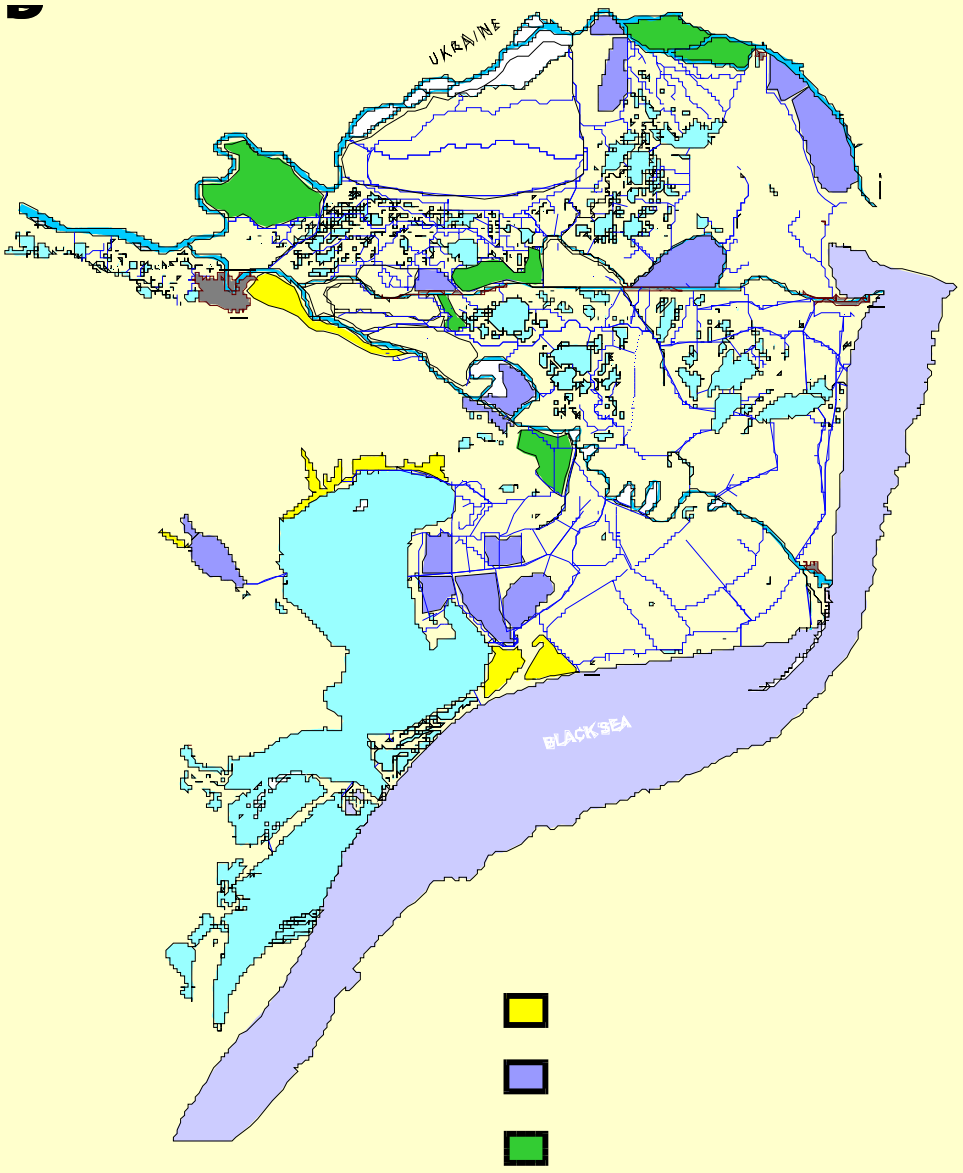


HYDROLOGY AND WATER QUALITY CHANGES



DAMMING AND CHANNEL EXCAVATION





CLIMATIC CHANGES AND THEIR IMPACT ON DANUBE DELTA

DANUBE RIVER low water level has a major impact on DANUBE DELTA

- Water (lacustrine) surface reduction

- Marsh or lacustrian areas changes into partial or total drained fields

Low water level impact on shoreline vegetation

- Macrophytes habitat reduction
- Bushes and reed expansion

DANUBE RIVER low water level has a major impact on DANUBE DELTA

- **Eutrofication**

- **Reduction of aquatic species which consist basic food resource of birds**

Migration from colonies

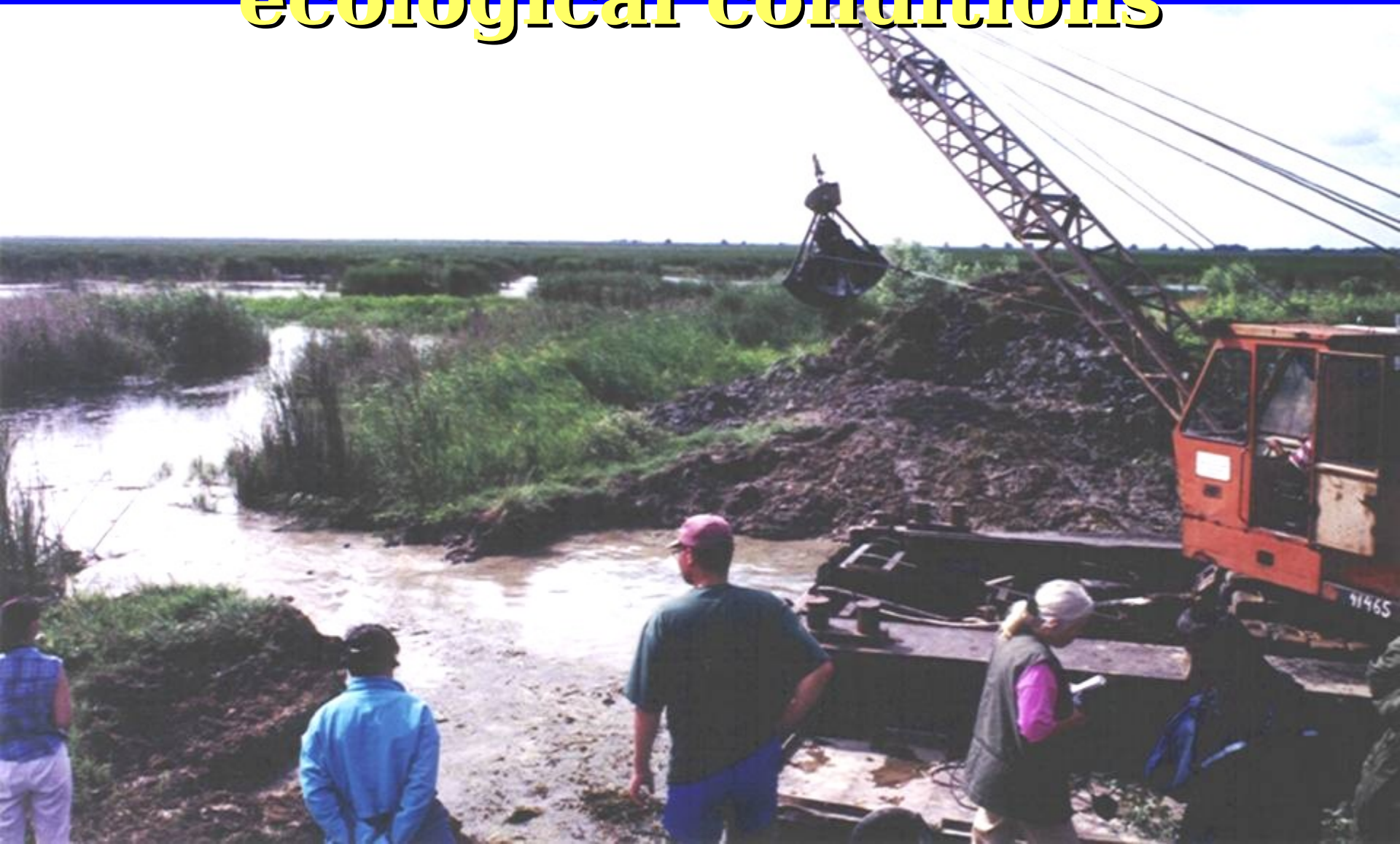
DANUBE RIVER low water level has a major impact on DANUBE DELTA

Easy access of predators (golden wolf, fox, ratoon dog) and hunters to colonies due to lake dry bottom

ECOLOGICAL RESTORATION MANAGEMENT OBJECTIVES

Ob.1. Protect and maintain population of species and habitats with ecological values

Ob.2. Manage water circulation in order to improve the ecological conditions



THE RESTORATION PROGRAMME HAS TWO MAIN CATEGORIES OF PROJECTS

- **WETLAND RESTORATION**

- Research, design, monitoring

- Civil works

- **HYDROLOGICAL SYSTEM REHABILITATION**

-Research and design

-Civil works

ADDITIONAL COMPONENTS

Restoration of:

- habitats and ecosystems

- endangered species

- affected landscape

The main actors

PARTNERS:

WWF Auen Institute, Rastatt, Germany

RIZA Institute, Lelystat, The Netherlands

ROMANIAN MINISTRY OF ENVIRONMENT AND WATER MANAGEMENT

WORLD BANK

REZERVAȚIA BIOSFEREI - DELTA DUNĂRII
TULCEA - ROMÂNIA

DANUBE DELTA NATIONAL INSTITUTE
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TULCEA / ROMANIA

ECOLOGICAL RESTORATION PROJECTS

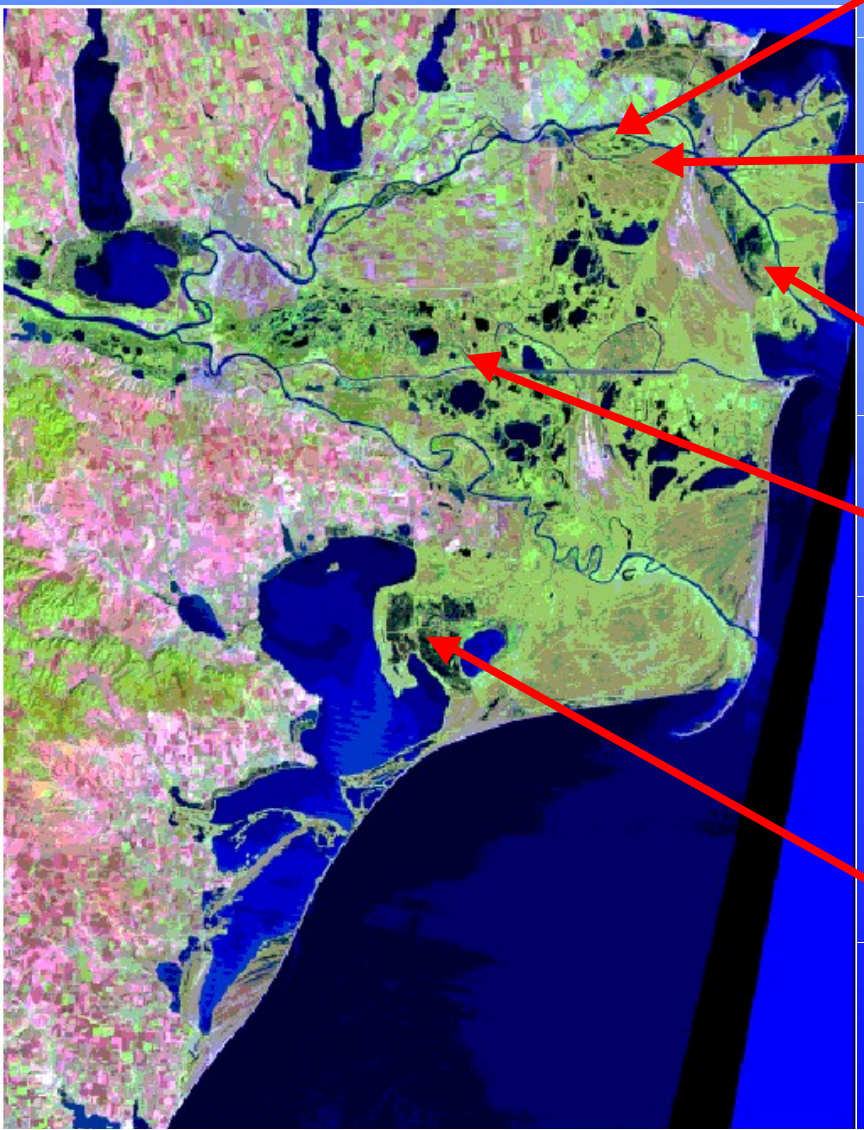
Objectives

- **Restore:**
  - **specific functions of the wetlands**
  - **lateral connectivity and reintegration in the natural river pulse system**
  - **natural habitats that support biodiversity and natural resources**
- **Recover traditional economic activities of the local communities**

RECOVERING OF THE NATURAL FUNCTIONS OF WETLANDS

- Hydrological
- Bio-geo-chemical
- Ecological

Implemented and ongoing Restoration Works in the Danube Delta



In 1994 Babina (2,100 ha),
- agricultural polder -

in 1996 Cernovca(1,580 ha)
- agricultural polder -

in 2000 Popina(3,600 ha)
- fishpond -

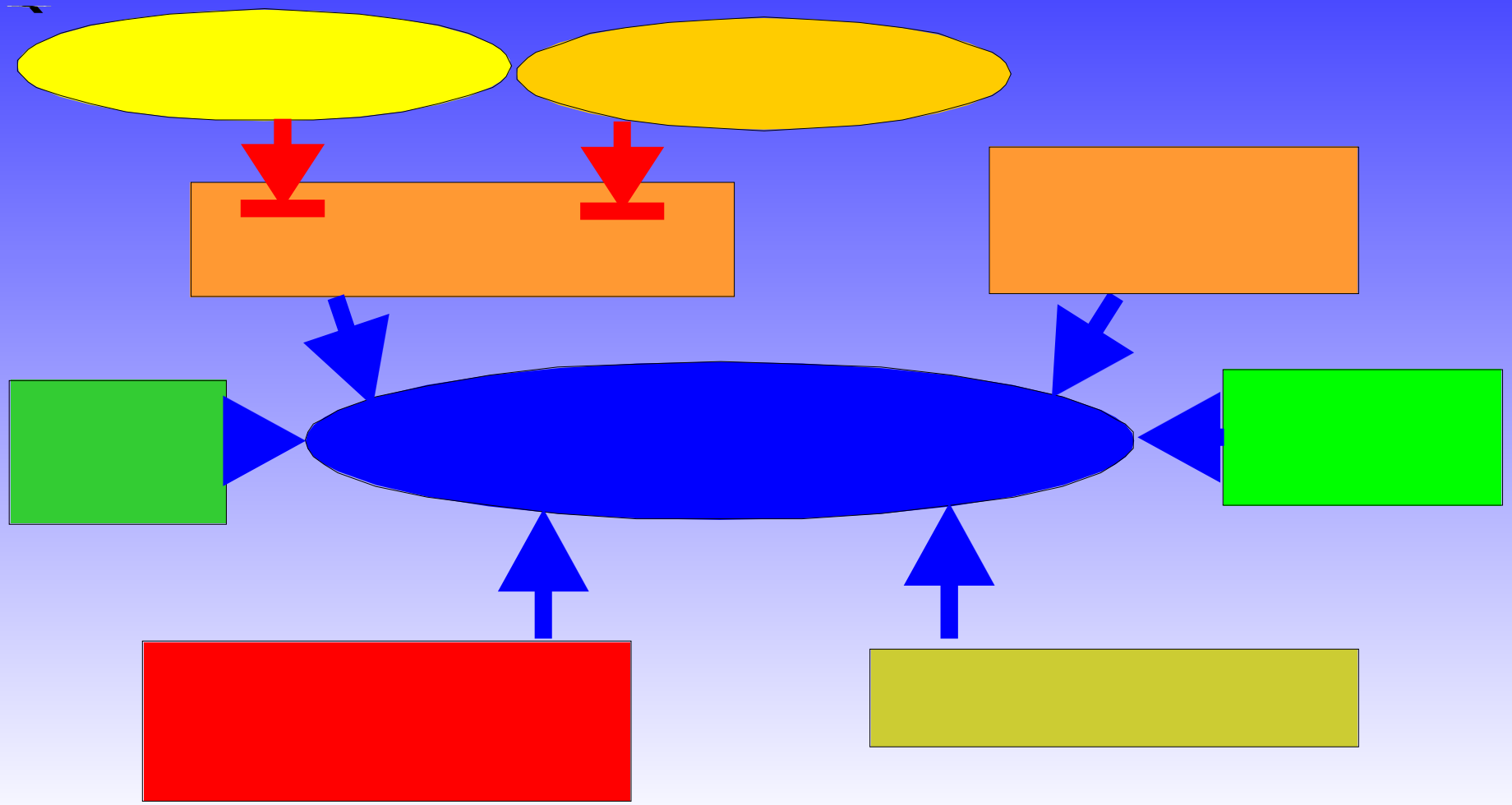
in 2002 Fortuna (2,115 ha) -
- agricultural polder -

Prospective areas to be restored

Holbina - Dunavat(5,630 ha)
- fishponds -

TOTAL: 15,025 ha

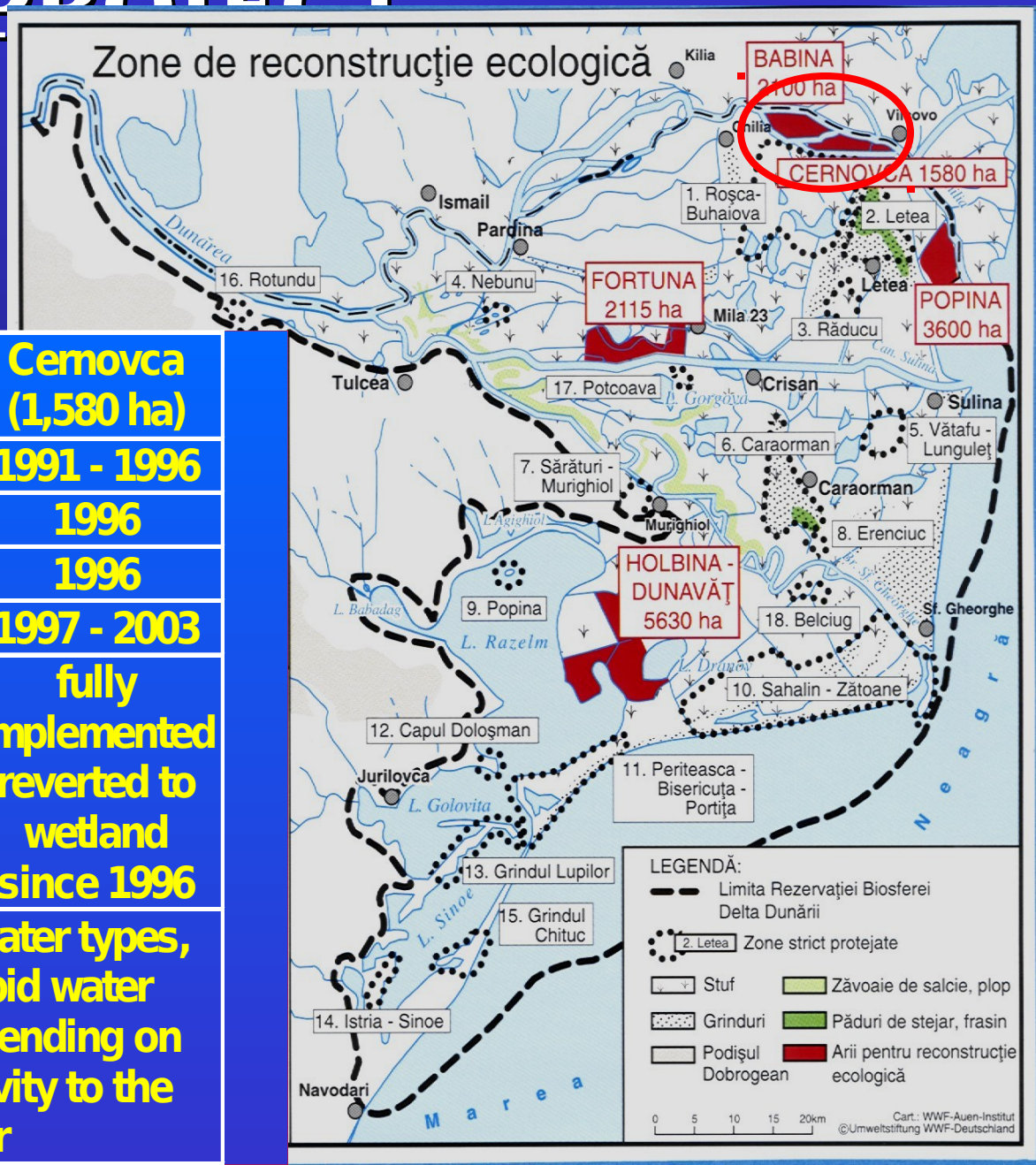
ENCOUNTERED CONSTRAINTS



ACTUAL AND IMPLEMENTED PROJECTS

BABINA-CERNOVCA PILOT PROJECT

	Babina (2,100 ha)	Cernovca (1,580 ha)
Research	1991 - 1994	1991 - 1996
Design	1994	1996
Implementation	1994	1996
Monitoring	1995 - 2003	1997 - 2003
Project status	fully implemented reverted to wetland since 1994	fully implemented reverted to wetland since 1996
Present status	a mosaic of water types, clear to turbid water systems, depending on the connectivity to the river	



BEFORE FLOODING

AMENAJARE AGRICOLĂ ABANDONATĂ ÎN DELTA DUNĂRII
Abandoned agricultural polder in the Danube Delta before restoration

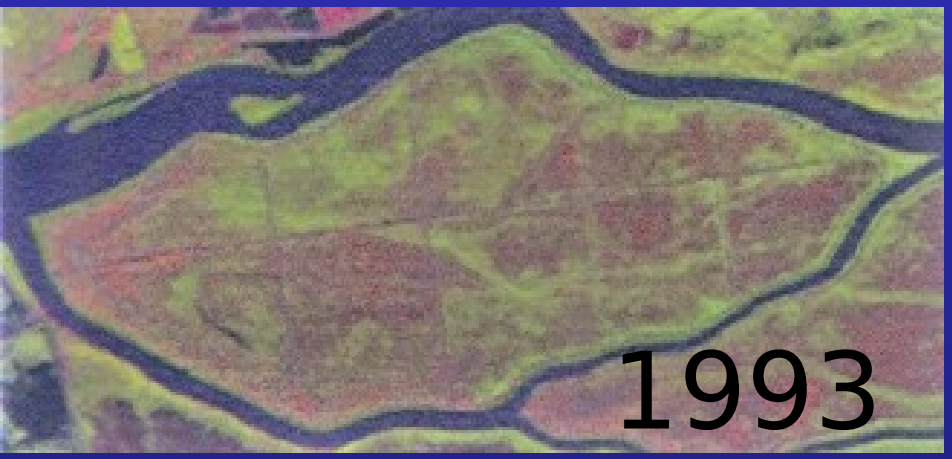
2 YEARS AFTER FLOODING

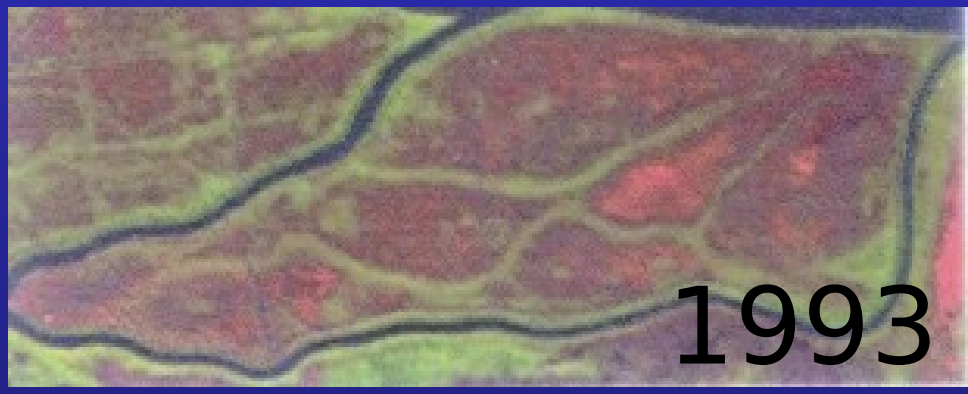
AMENAJARE AGRICOLĂ RENATURATĂ ÎN DELTA DUNĂRII
Agricultural polder in the Danube Delta after restoration

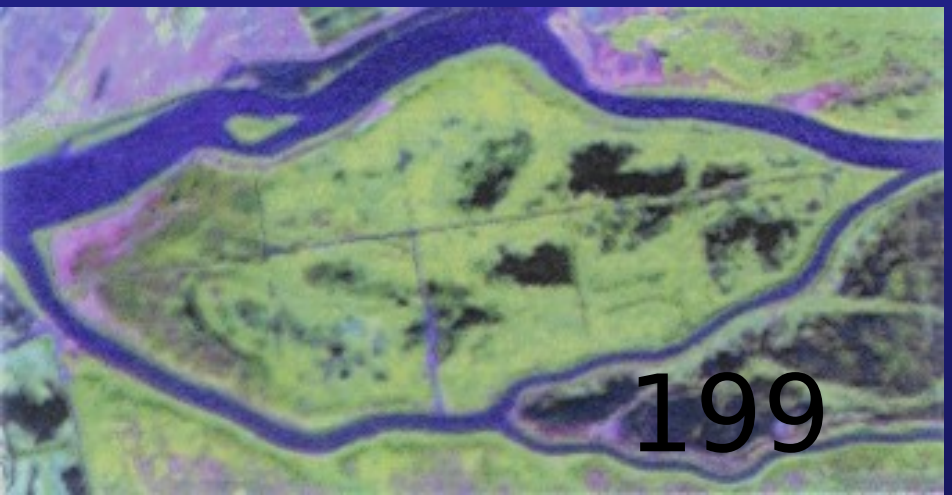
AMENAJARE AGRICOLÃ ABANDONATÃ ÎN DELTA DUNÃRII
Abandoned agricultural polder in the Danube Delta before restoration

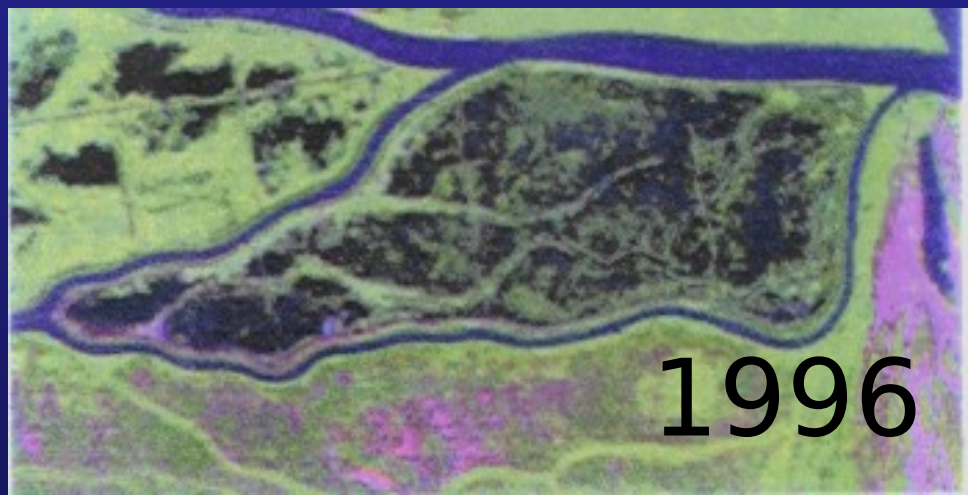
AMENAJARE AGRICOLÃ RENATURATÃ ÎN DELTA DUNÃRII
Agricultural polder in the Danube Delta after restoration

Babina-Cernovca area
(satellite images)









BIOLOGICAL FILTERING CAPACITY OF THE PALUSTRIAN AND AQUATIC VEGETATION

CONTACT OF CLEAN WATER FROM RESTORED AREA WITH DANUBE WATER RICH IN SEDIMENTS

CONTROL FISHING RESULTS IN RESTORED AREAS INDICAT
THE PRESENCE OF BOTH REPRODUCERS AND YOUNG FISH

BENEFITS OF ECOLOGICAL RESTORATION
BABINA&CERNOVCA PILOT PROJECTS - S=3,600HA

UNSUSTAINABLE / ABANDONED POLDERS

WETLAND REHABILITATION

FILTERING

ECONOMICAL RESULTS

FISH: 34 KG/HA/YEAR
REED: 1-2 TONES/HA/YEAR
PASTURE: 0,5 UVM/HA/YEAR

50-100 EURO/HA/YEAR with low costs instead subsidies

ECOLOGICAL VALUES

NUTRIENT REMOVAL
- 15 KG PHOSPHORUS/HA/YEAR
- 335 KG NITROGEN/HA/YEAR

SEDIMENT RETENTION
- 11 TONES/HA/YEAR

HABITAT FOR BIRDS AND FISHES

AESTHETIC VALUES

WATER STORAGE

ONOMICAL INDICATOR: MAXIMUM COST/BENEFIT RAT
BABINA&CERNOVCA PILOT PROJECTS - S=3,600HA

COSTS:

RESEARCH, DESIGN & IMPLEMENTATION: 100,000 EURO

BENEFITS:

FISH YIELD: 3,600HA x 34KG x 0.5EURO/KG = 60,000EU

REED HARVEST: 3,600HA x 1T/HA x 16EURO/T = 60,000EUR

TOURISM: 10TURISTS x 100DAYS/YEAR x 10EURO/DAY = 10,000EURO

CATTLE: 100HA x 0.5UVM/HA x 100KG x 2EURO/KG = 10,000EU

TOTAL VALUE : 140,000 EURO
at low labour costs

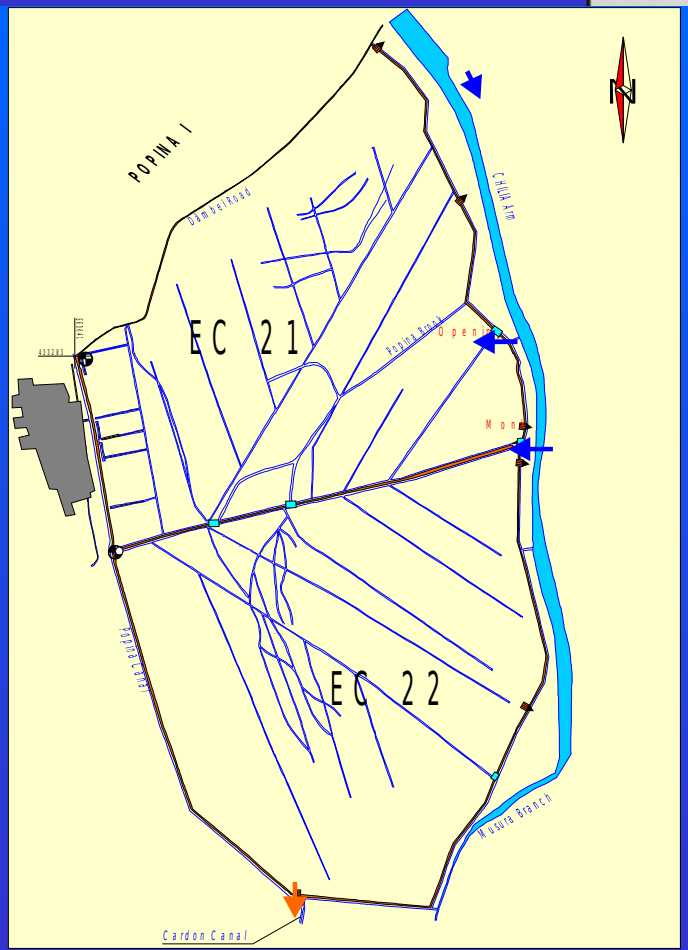
SUCCESSES

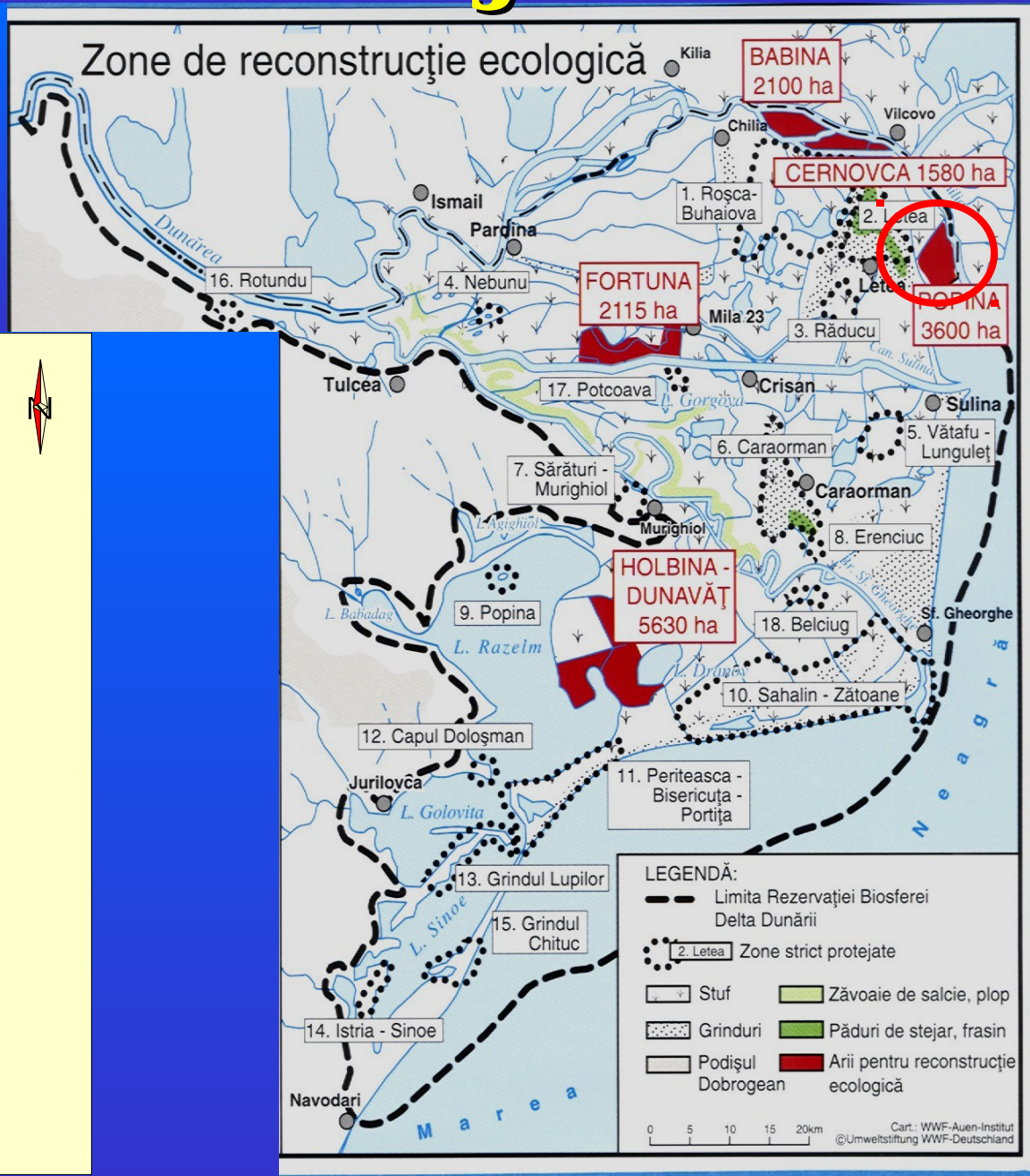
DANUBE DELTA
RESEARCH & DESIGN
INSTITUTE
&
DANUBE
DELTA
BIOSPHERE
RESERVE
AUTHORITY
AWARDS FOR
ECOLOGICAL RESTORATION
AIR
AGIR AWARD - 1995
GENERAL ASSOCIATION OF
ROMANIAN ENGINEERS
EUROSITE AWARD -1995
EUROPEAN COMMUNITY
WWF
WWF CONSERVATION MERIT AWARD -1996
WORLD WIDE FUND FOR NATURE (WWF)

POPINA PROJECT

- **S = 3,600 ha, fish ponds**
  -Research: 1996-1999
  -Implemented since 2000
  -Status: permanent

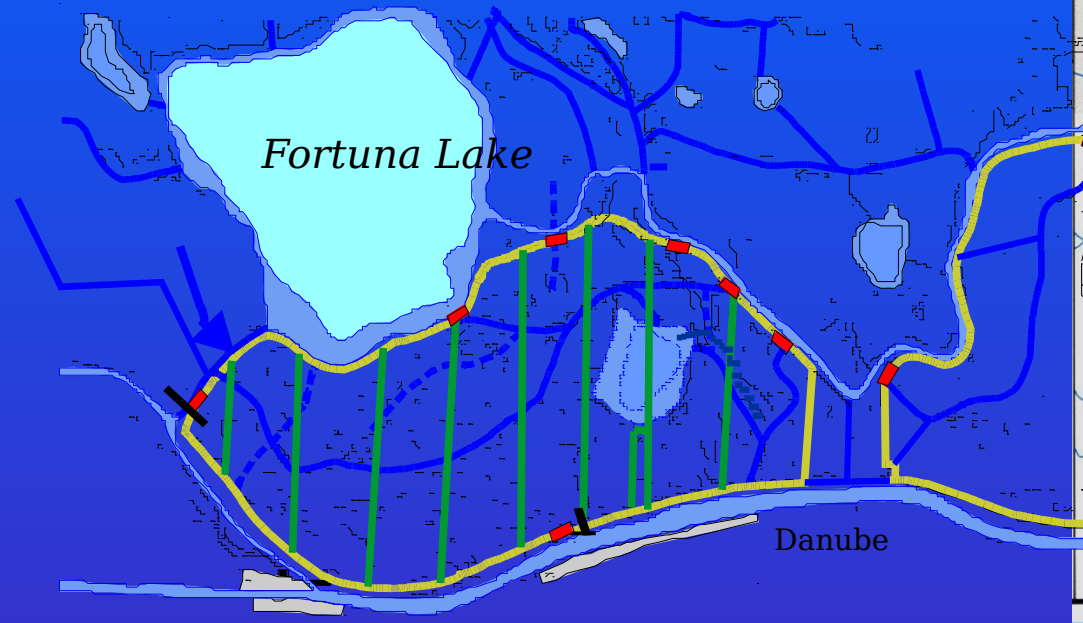
wetland connected to the river

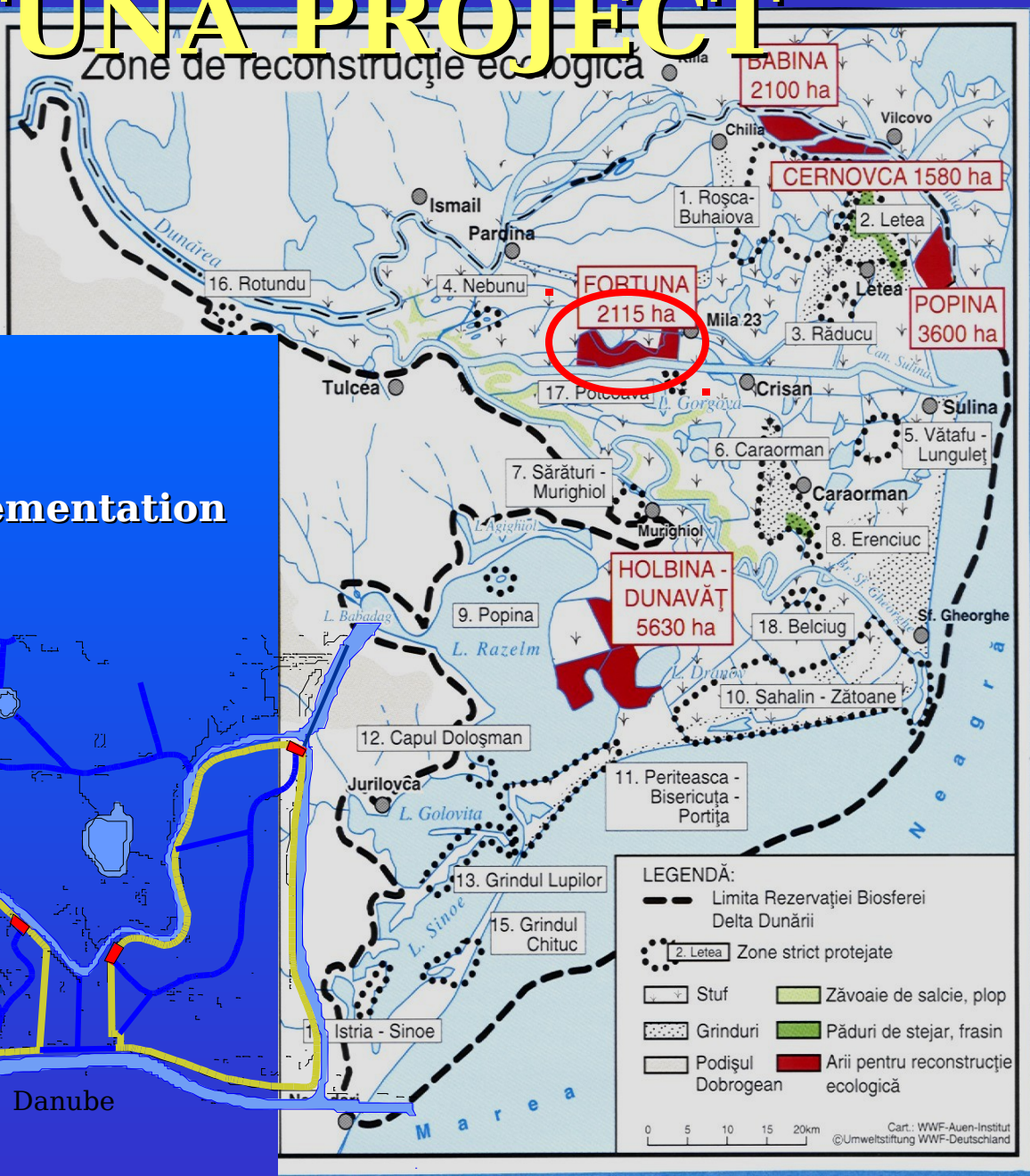




FORTUNA PROJECT

- **S = 2,115 ha**
  -Former polder for forestry
  -Research: 2000-2002
  -Present status: under implementation





HOLBINA-PROJECT

S = 5,630 ha, former fish farms

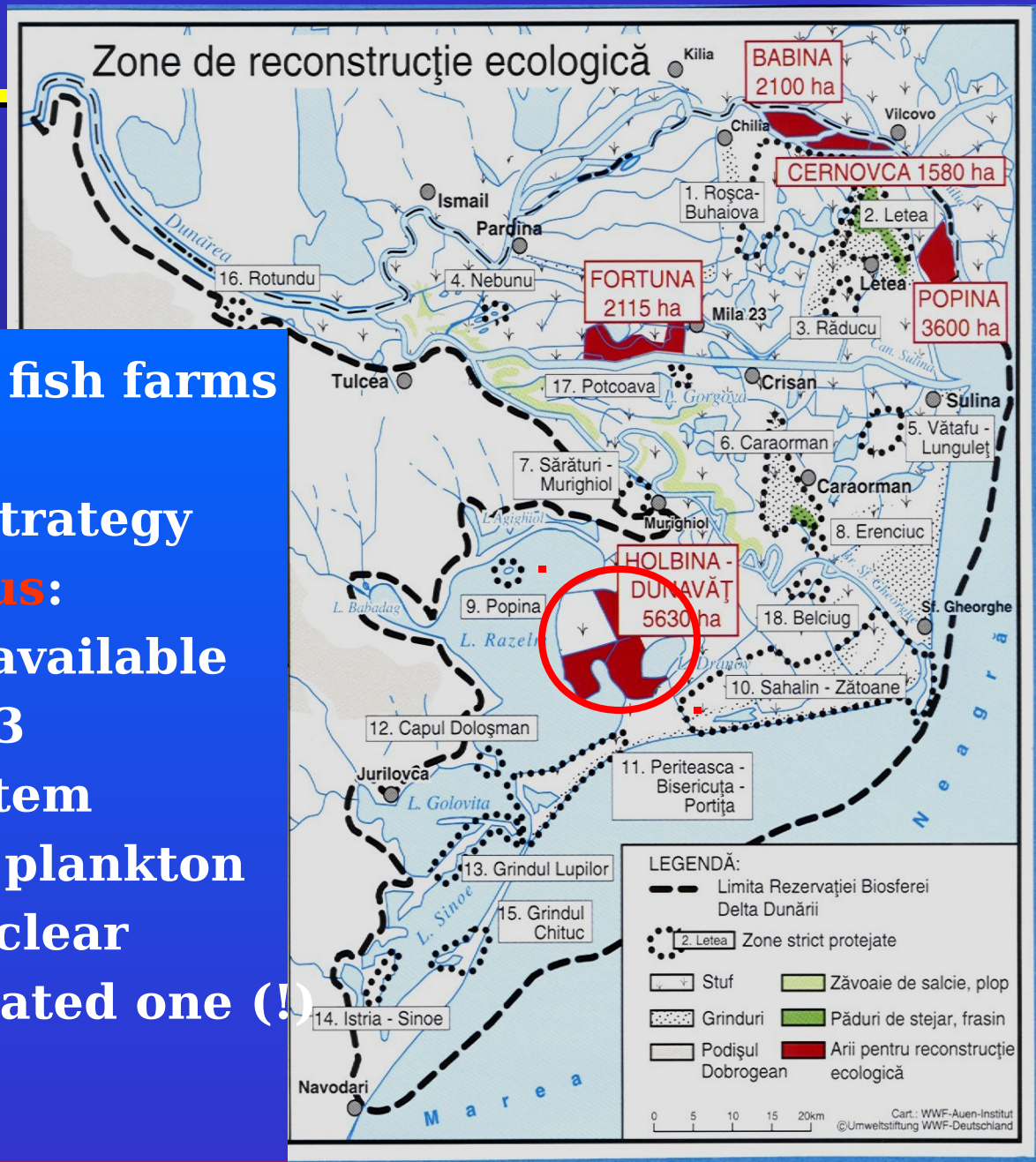
Research: 1993-1996

Result: Restoration strategy

Implementation status:

investment funds available since 2003

Evolution: water system reverted from turbid plankton - dominated state to clear macrophytes - dominated one (!)



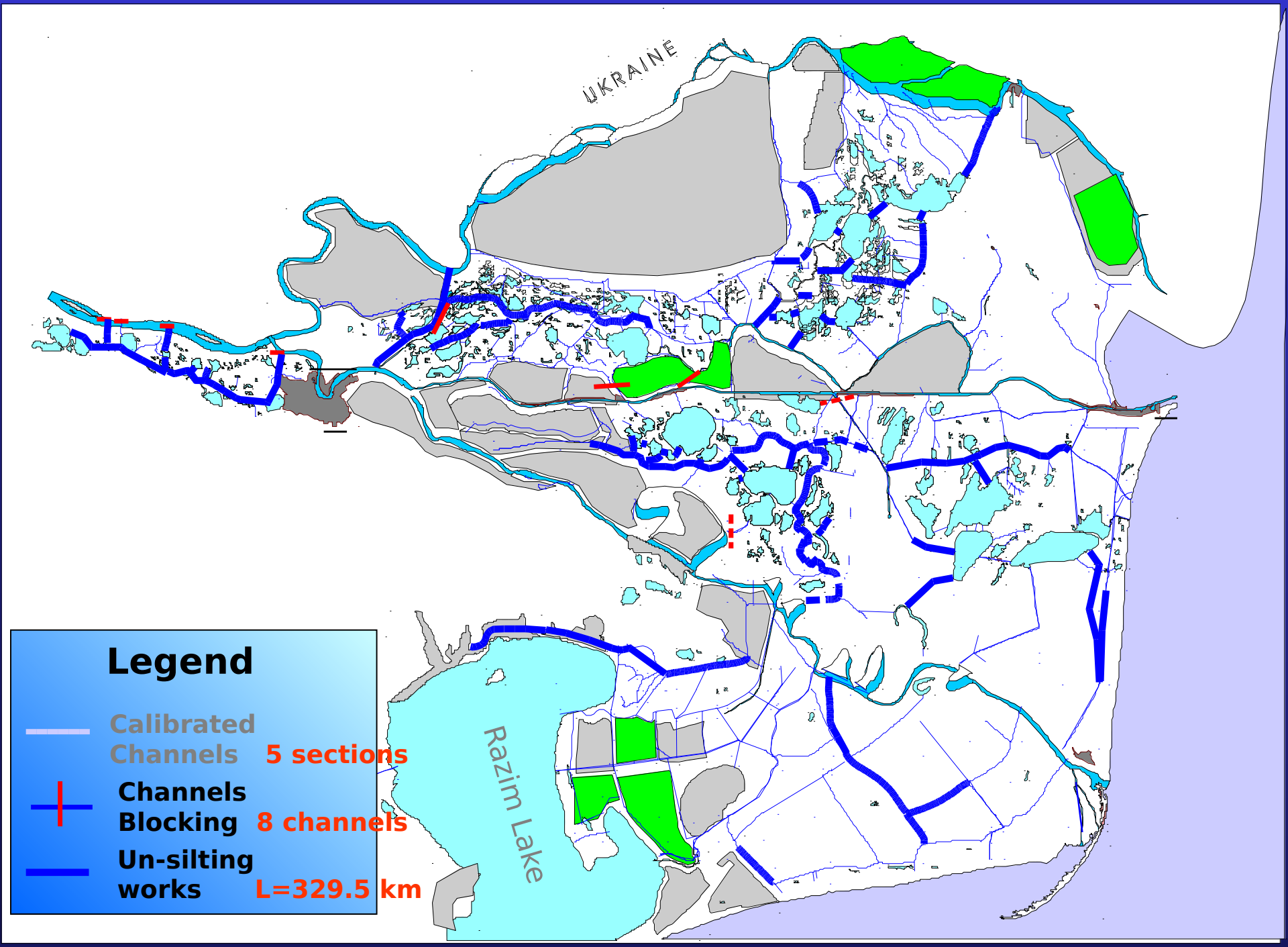
WATER CIRCULATION IMPROVEMENT

Objectives

- close or calibrate the artificial North-South oriented canals
- calibrate the (semi-)natural West-East channels
- calibrate the lake entrances

From 3,400 km of channels 329.5 km have been dredged, 8 canals - closed

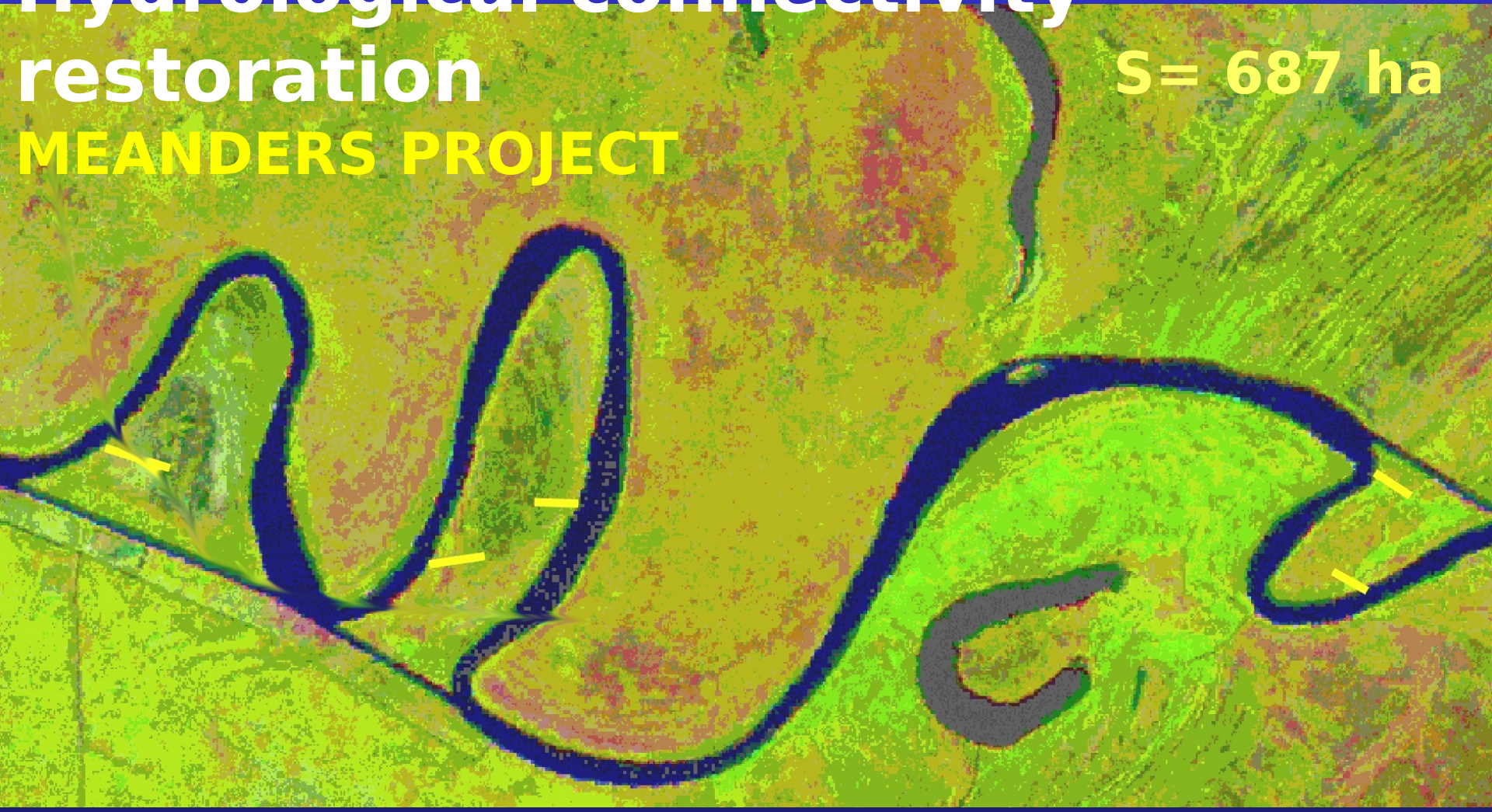
and 5 sections - calibrated


UKRAINE
Razim Lake
Legend
Calibrated Channels 5 sections
Channels Blocking 8 channels
Un-silting works L=329.5 km

Hydrological connectivity restoration

MEANDERS PROJECT

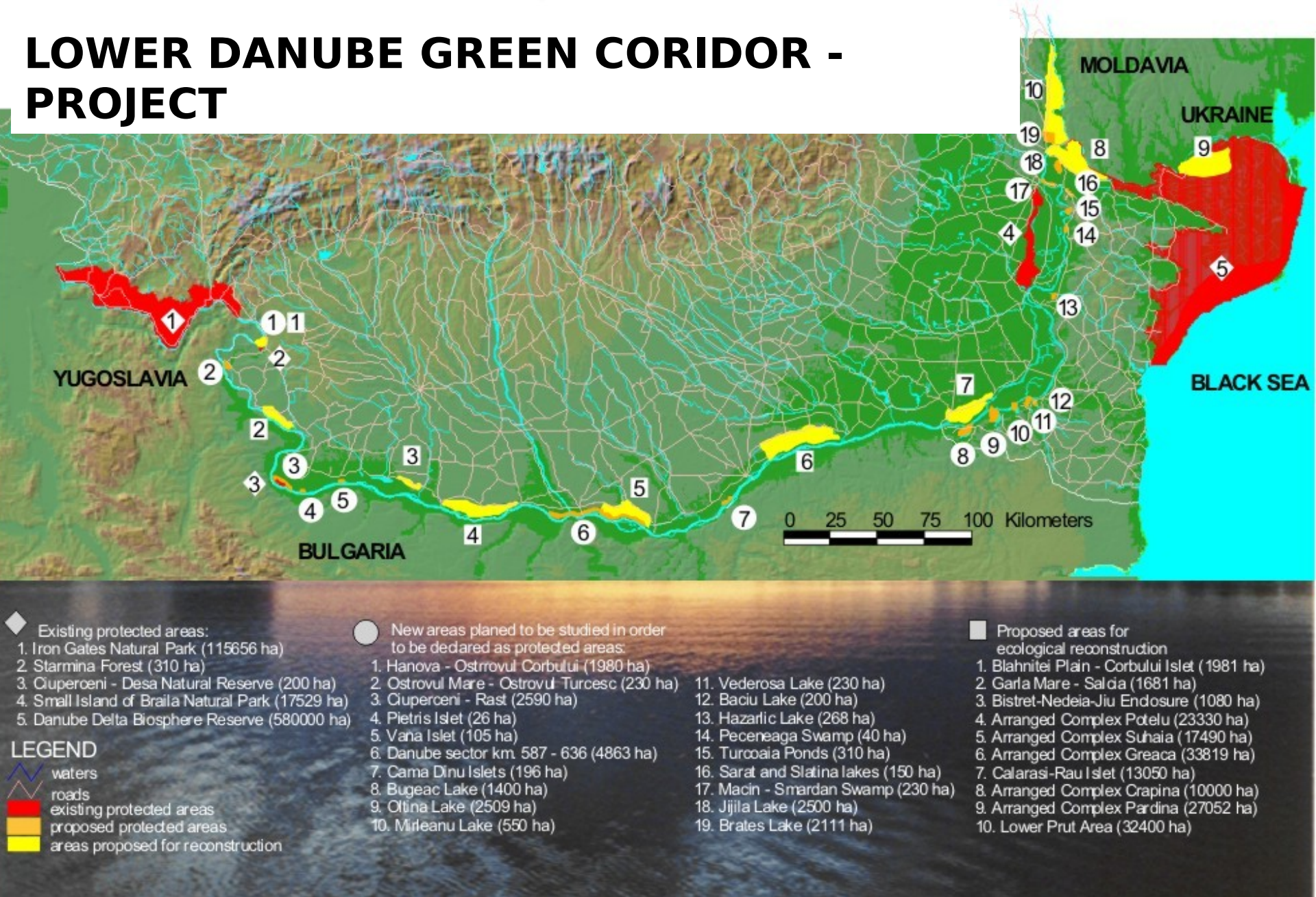
S= 687 ha



3 islands - created as a result of rectification of Danube arm - were proposed to be connected

FUTURE PROSPECTIVES

LOWER DANUBE GREEN CORIDOR - PROJECT


MOLDAVIA
UKRAINE
BLACK SEA
YUGOSLAVIA
BULGARIA
0 25 50 75 100 Kilometers
Existing protected areas:
1. Iron Gates Natural Park (115656 ha)
2. Starmina Forest (310 ha)
3. Ciuperceni - Desa Natural Reserve (200 ha)
4. Small Island of Braila Natural Park (17529 ha)
5. Danube Delta Biosphere Reserve (580000 ha)
LEGEND
waters
roads
existing protected areas
proposed protected areas
areas proposed for reconstruction
New areas planed to be studied in order to be declared as protected areas:
1. Hanova - Ostrrovul Corbului (1980 ha)
2. Ostrovul Mare - Ostrovul Turcesc (230 ha)
3. Ciuperceni - Rast (2590 ha)
4. Pietris Islet (26 ha)
5. Vana Islet (105 ha)
6. Danube sector km. 587 - 636 (4863 ha)
7. Cama Dinu Islets (196 ha)
8. Bugeac Lake (1400 ha)
9. Oltina Lake (2509 ha)
10. Mirleanu Lake (550 ha)
11. Vederosa Lake (230 ha)
12. Baciu Lake (200 ha)
13. Hazarlic Lake (268 ha)
14. Peceneaga Swamp (40 ha)
15. Turcoaia Ponds (310 ha)
16. Sarat and Slatina lakes (150 ha)
17. Macin - Smardan Swamp (230 ha)
18. Jijila Lake (2500 ha)
19. Brates Lake (2111 ha)
Proposed areas for ecological reconstruction
1. Blahnitei Plain - Corbului Islet (1981 ha)
2. Garla Mare - Salcia (1681 ha)
3. Bistret-Nedeia-Jiu Enclosure (1080 ha)
4. Arranged Complex Potelu (23330 ha)
5. Arranged Complex Suhaia (17490 ha)
6. Arranged Complex Greaca (33819 ha)
7. Calarasi-Rau Islet (13050 ha)
8. Arranged Complex Crapina (10000 ha)
9. Arranged Complex Pardina (27052 ha)
10. Lower Prut Area (32400 ha)

ECOLOGICAL RESTORATION
IS
OUR CHALLENGE FOR
PROTECTED AREAS
CONSERVATION

THANK YOU